

ACCEPTANCE TEST/INSPECTION PROCEDURES

SYSTEM "C"

1.0 PURPOSE

Successful completion of the tests in this procedure will provide the basis for acceptance of System C by the customer.

The performance of System C as a system, and compatibility between System C and the customer furnished teletypewriter equipment will be demonstrated.

The transmit and operational configuration of System C will be shown.

2.0 REFERENCE INFORMATION

The drawings, manuals and other documentation listed in the following paragraphs should be available during performance of these tests.

2.1 Drawings

- a. Schematic, Audio Control Panel
- b. Schematic, Connector Panel, System C
- c. Power Wiring, System C
- d. Outline Drawing, Equipment Cabinet
- e. Outline Drawing, Auxiliary Transit Case

2.2 Manuals

- a. 718U-4 hf Transceiver
- b. 490B-4 hf Antenna coupler
- c. 514A-4 hf Control Head
- d. System C System Manual
- e. DRC40-60A dc Power Supply
- f. 1 kHz Oscillator
- g. RA6217A hf Receiver
- h. FSK Demodulator Model 1200
- i. Frequency Shift Tone Keyer, Type 211
- j. Dual Frequency Shift Tone Keyer
Shelf, Type 244
- k. Power Supply, Type 251

2.3 Other Documentation

- a. "Design Plan, Transportable Communications Terminals"
b. ON-AIR Test Plan (See 5.3).
c. Teletypewriter equipment information as required.

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3.0 EQUIPMENT REQUIRED

3.1 Test Equipment

<u>Item</u>	<u>Description</u>	<u>Quantity</u>
a.	VOM, Triplet 630 or equivalent	1
b.	VTVM, *HP 400D	1
c.	Transformer, HP1105A	3
d.	Frequency Counter, HP5245L	1
e.	28vdc Power Supply KEPCO KS60-5M	1
f.	Hf Dummy Load, 50 ohm, 1kw, BIRD 694	1
g.	Rf Wattmeter, BIRD 43	1
h.	Hf Insert for rf Wattmeter, BIRD 500H	1
i.	Rf Signal Generator, HP606B (for hf)	1
j.	Rf Attenuator, 120db, HP355D	1
k.	Test leads, connectors, cable, resistors	As required

*HP = Hewlett Packard

3.2 GFE Equipment Required

- a. Teletypewriter Equipment
b. CW Key
c. Headsets

4.0 INITIAL CONDITIONS

4.1 Environmental

4.1.1 OFF-AIR Tests: Normal laboratory ambient

4.1.2 ON-AIR Tests: Normal laboratory ambient, and existing outside ambient.

4.2 Power: Normal building 208vac, 60Hz

4.3 Equipment

- a. All System C equipment installed and/or packaged for transit in Equipment Cabinet and/or Auxiliary Transit Case.

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5.0 TEST PROCEDURE

Switch and control positions, cable and equipment connections should remain as stated until procedure directs a change.

5.1 Set-Up

- 5.1.1 Remove front and rear covers of Equipment Cabinet. Examine Equipment Cabinet for location, accessibility, appearance, secureness of equipment.
- 5.1.2 Remove cover from Auxiliary Transit Case. Examine location, accessibility, appearance, secureness of equipment and cables.
- 5.1.3 Check building primary ac voltage.

5.2 OFF-AIR Tests

5.2.1 Audio Control Panel Test

- 5.2.1.1 Connect the equipment as shown in Figure 6-1. DO NOT connect the AC power cable or turn the external 28vdc power supply on initially. Select OSC1(S-2), OFF (S-1), both SPKR GAIN maximum CCW (lowest volume) on the Audio Control Panel. Make certain that CB-1 and CB-2 on the connector panel are OFF.
- 5.2.1.2 Connect the external 28vdc power supply (KEPCO KS60-5M) to TB-2 on the Audio Control Panel (ACP) as shown. Turn on the supply and adjust to 28vdc.
- 5.2.1.3 Switch S1 on the ACP to CW and depress the CW Key. Read the VTVM and the frequency counter.
- 5.2.1.4 Release the CW Key, read the VTVM and the frequency counter.
- 5.2.1.5 Select OSC2 at S2, depress the CW Key and read the VTVM and the frequency counter.
- 5.2.1.6 Release the CW Key, read the VTVM and the frequency counter.
- 5.2.1.7 Remove the VTVM from J8. With a patch cord connect J8 to J19. Depress CW Key, check for tone in Speaker #1.

- 5.2.1.8 Check operation of Speaker #1 circuit by varying SPKR GAIN control. Adjust for comfortable level.
- 5.2.1.9 Connect headset to J-25 headset jack, check for speaker muting.
- 5.2.1.10 Check operation of headset circuit by varying SPKR GAIN control.
- 5.2.1.11 Release CW Key, check for tone in headset.
- 5.2.1.12 Remove the patch cord from J19 and connect to J20. Depress CW Key, check for tone in Speaker #2.
- 5.2.1.13 Check operation of Speaker #2 circuit by varying SPKR GAIN control. Adjust for comfortable level.
- 5.2.1.14 Connect headset to J-26 headset jack, check for speaker muting.
- 5.2.1.15 Check operation of headset circuit by varying SPKR GAIN control.
- 5.2.1.16 Release CW Key, check for tone in headset.
- 5.2.1.17 Remove the headset and patch cord. Patch in a VOM, set to RX1000 to J13 on the ACP. Read the VOM.
- 5.2.1.18 Select switch S1 to FSK. Read the VOM.
- 5.2.1.19 Select switch S1 to OFF. Read the VOM. Remove VOM patch from J13.
- 5.2.1.20 Connect a jumper on the terminal boards of the ACP from TB2-2 to TB1-10A. READY light should be lighted. Remove jumper.
- 5.2.1.21 Connect a jumper from TB2-2 to TB1-10B. FAULT light should be lighted. Remove jumper.
- 5.2.1.22 Disconnect coupler control cable at the antenna coupler end. Jumper pin C to D. READY light should light. Remove jumper.
- 5.2.1.23 At the coupler end of the cable jumper pins J to D. FAULT light should light. Remove jumper. Reconnect coupler control cable.

5.2.1.24 Remove the external 28v power supply. Remove the 718U-4 equipments from the radio shelf. Make the following switch selections at the Connector Panel of the Equipment Cabinet:

CB1 - OFF
CB2 - OFF
S1 - OFF

5.2.1.25 Connect the ac primary power. Select S1 to ON. Check the secondary voltage of T-1 at TB-2 pins 1 and 3.

5.2.1.26 Remove the contact keying strap on the Northern 244 FSK Keyer Shelf. Turn power S-1 to ON. Select the following conditions on the Model 1200 demodulators:

Power: ON

All other controls to "Home-Base" or Red Position

5.2.1.27 Switch the Sorensen DCR40-60A power supply ON. Adjust the output voltage to 28 ± 1 vdc.

5.2.1.28 Switch CB-2 ON. Check voltage at the ACP TB2-1(+) and TB2-2(-) with VOM on 60 vdc scale.

5.2.1.29 Switch CB1 to ON. Check voltage at equipment shelf connector J3-17(+) and J3-13(-) with VOM on 60vdc scale. Switch CB1 to OFF.

5.2.1.30 Patch the VTVM and the frequency counter into J2 on the ACP. Read the VTVM. Read the frequency counter. ("Space" output)

5.2.1.31 On the 244 Keyer Shelf at terminal board E-1 jumper terminal 1 to terminal 3. Read the VTVM. Read the frequency counter. ("Mark" output)

5.2.1.32 Remove the VTVM and frequency counter from J2. With a patch cord connect J2 to J15. DS2 (MARK INDICATOR) on Demodulator No. 1 should light.

5.2.1.33 Remove the jumper on E-1. DS2 should extinguish and DS1 (SPACE INDICATOR) should light. Remove patch cord from J2 to J15.

5.2.1.34 Patch the VTVM and frequency counter in J6 on the ACP. Read the VTVM. Read the frequency counter. (Space output).

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- 5.2.1.35 On the 244 Keyer Shelf, terminal board E-1, jumper terminals 4 to 6. Read the VTVM. Read the frequency counter. (Mark output.)
- 5.2.1.36 Remove the VTVM and frequency counter from J6. With a patch cord, connect J6 to J18. DS2 (MARK INDICATOR) on Demodulator No. 2 should light.
- 5.2.1.37 Remove the jumper on E-1. DS2 should extinguish and DS1 (SPACE INDICATOR) should light. Remove patch cord from J6 to J18.
- 5.2.1.38 Select AGC-LG and DET-B.F.O. MODE-SSB-1.5 on the RA6217A hf receiver. (See chapter 3, section 12 of the RA6217A Instruction Manual.) Tune to 12.000 MHz. Patch VTVM across a 600 ohm resistor into J3 on the ACP. Connect the rf oscillator (HP606B) and frequency counter to the antenna end of rf cable which is connected to J3 on the Connector Panel. (See Fig. 6-1.)
- 5.2.1.39 Adjust rf oscillator (HP606B) to 12.002975 MHz (receiver frequency plus fsk "mark" frequency) at 50 uv. Read the VTVM.
- 5.2.1.40 Remove the VTVM from J3. DS2 (MARK INDICATOR) on Demodulator No. 1 should light.
- 5.2.1.41 Patch VTVM into J3. Adjust rf oscillator to 12.002125 MHz (receiver frequency plus fsk "space" frequency at 50 uv. Read the VTVM.
- 5.2.1.42 Remove the VTVM from J3. DS1 (SPACE INDICATOR) on Demodulator No. 1 should light.
- 5.2.1.43 Remove the test equipment from the receive coax cable. Terminate the cable with the 75 ohm termination.

5.2.2 HF Tests

- 5.2.2.1 Disconnect all test equipment. Turn OFF the RA6217A. MAKE CERTAIN CB-1 IS OFF. Reinstall 718U-4 equipment. Disconnect the hf antenna lead from the front of the 490T-2 coupler. Connect the hf dummy load coax center conductor to the front of the 490T-2 coupler, connect the shield (pig tail) to one of the mounting screws ground rf output.
- 5.2.2.2 Switch CB-1 to ON. On the 514A-4 control unit select USB and 18.0 MHz. Check that the 718U-4 equipment tunes and that the READY light on the ACU operates properly. (No light while radio is tuning. READY light ON after tune complete.) Also, note that both FAULT lights are not lighted.

- 5.2.2.3 Patch the CW Key into J9. Press the CW Key and read the forward power at the rf wattmeter. Read the hf dummy load wattmeter. Release the CW Key.
- 5.2.2.4 Select a frequency of 4.0000 MHz at the 514A-4. Repeat 5.2.2.3.
- 5.2.2.5 Select a frequency of 29.0000 MHz at the 514A-4. Repeat 5.2.2.3.
- 5.2.2.6 Select a frequency of 12.0000 MHz at the 514A-4. Repeat 5.2.2.3.
- 5.2.2.7 Select OFF at the 514A-4. Repeat 5.2.2.3.
- 5.2.2.8 Select USB at the 514A-4. (Radio should retune - note READY light operation). Remove CW Key from J9.
- 5.2.2.9 Patch J8 to J14 and J3 to J19. Connect the rf attenuator, with full attenuation inserted, in the receive coax cable as shown in Figure 6-2. Route the terminated receive coax near the dummy load.
- 5.2.2.10 Turn ON and adjust the RA6217A hf receiver to 12.0000 MHz.
- 5.2.2.11 Patch the CW Key into J21 on the ACU patch panel and select CW on S1. Depress the CW Key, adjust external rf attenuator, SPKR GAIN control, the receiver rf gain, af gain, and rf attenuator, and the receiver coax location for an acceptable CW tone in Speaker No. 1. Release CW Key and Select S1 on the ACU to OFF.
- 5.2.2.12 Remove the CW Key from J21 and connect to J9. Depress the CW Key and again check for an acceptable CW tone in Speaker No. 1. Release the CW Key and remove it from the patch field.
- 5.2.2.13 Remove the patch cord from J18 to J14. Select FSK on S1. Check for FSK "Space" tone in Speaker No. 1. Select S1 to OFF.
- 5.2.2.14 Connect a jumper at the Connector Panel TB-3 terminal 1 to terminal 2. Select S1 to FSK. Check

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for the FSK "Mark" tone in Speaker No. 1. Return S2 to OFF. Remove jumper on TB-3 and the patch cord from J3 to J19.

5.2.2.15 Turn off the FSK tone keyers.

Restore the contact keying strap removed in 5.2.1.22.

Connect the GFE full duplex teletypewriter and loop power supplies to TB-3 on the connector panel. Note: 20 ma, neutral "negative" current keying (square wave) will be used. Connect the common (positive) side of the keying battery supply to TB3-2 or TB3-4. Connect the keyed "High" (negative) side of the keying loop (through adequate external protective resistance) to TB3-1 or TB3-3.

5.2.2.16 Turn power ON to the 244 Keyer Shelf. Turn on the GFE teletypewriter units and loop power supplies. Set the current for 20 ma \pm 2 in each loop.

5.2.2.17 Operate the TTY in the full duplex mode and check for receipt of message through FSK Keyer, hf transmitter, hf receiver and FSK Demodulator.

5.2.2.18 Patch J6 to J14 and J3 to J18 at the ACP jack field. Repeat 5.2.1.49.

5.2.2.19 Disconnect all test equipment. Switch CB-1, CB-2 and S-1 on the Connector Panel to OFF.

5.3 ON-AIR Tests

- a. The ON-AIR tests will be performed after successful completions of all of the above tests.

- c. Far end terminals will be provided by the customer.
- d. Operation and maintenance personnel for the GFE teletypewriter, FSK, and security equipment, will be provided by the customer.
- e. Operating frequencies will be furnished by the customer.

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- f. Length and type of tests will be determined by the customer.
- g. Equipment will be connected as shown on Figure 6-3 for ON-AIR tests.

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6.0 FIGURES

This section contains system and equipment configuration Figures 6-1, 6-2 and 6-3.

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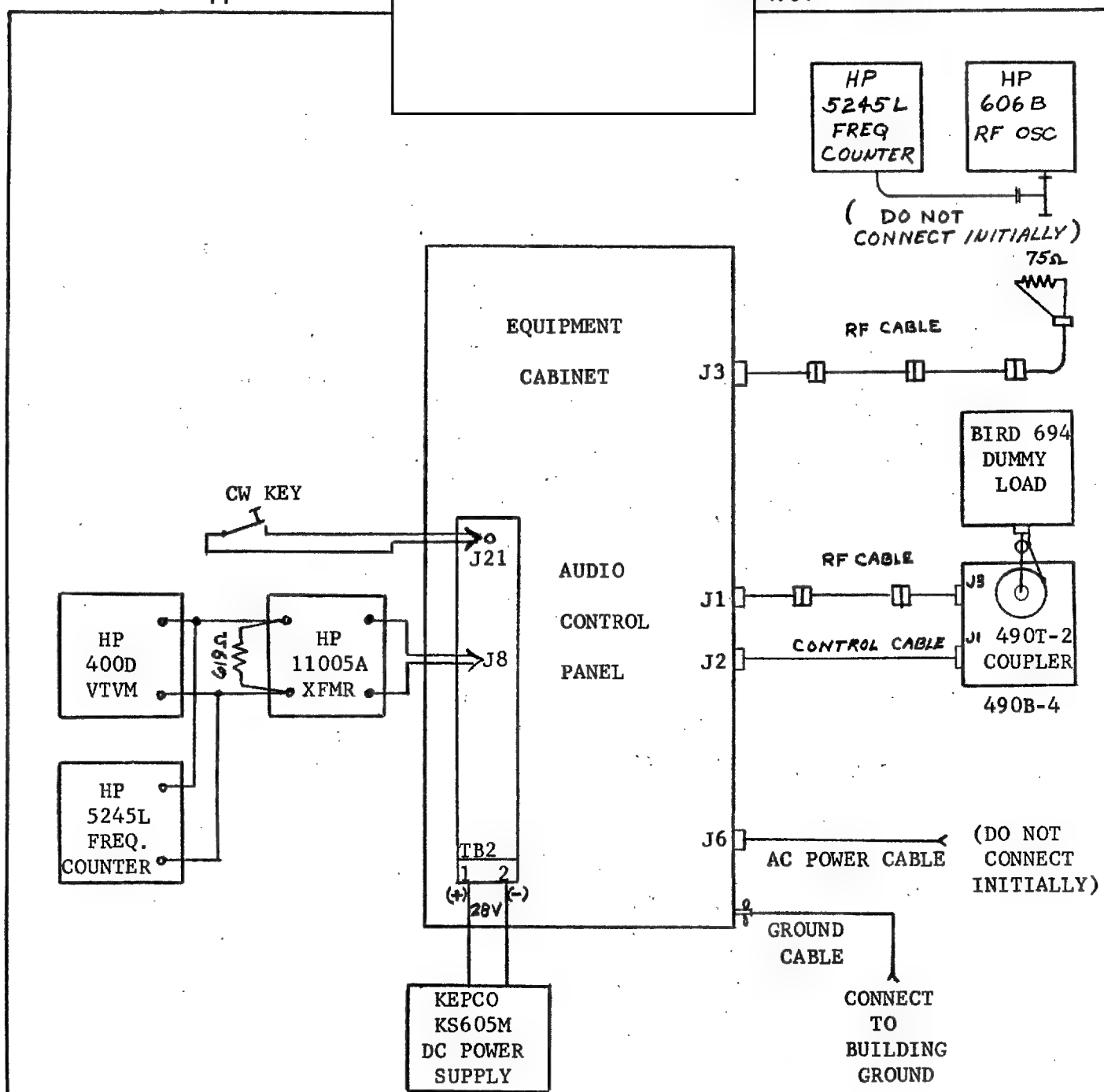


FIGURE 6-1

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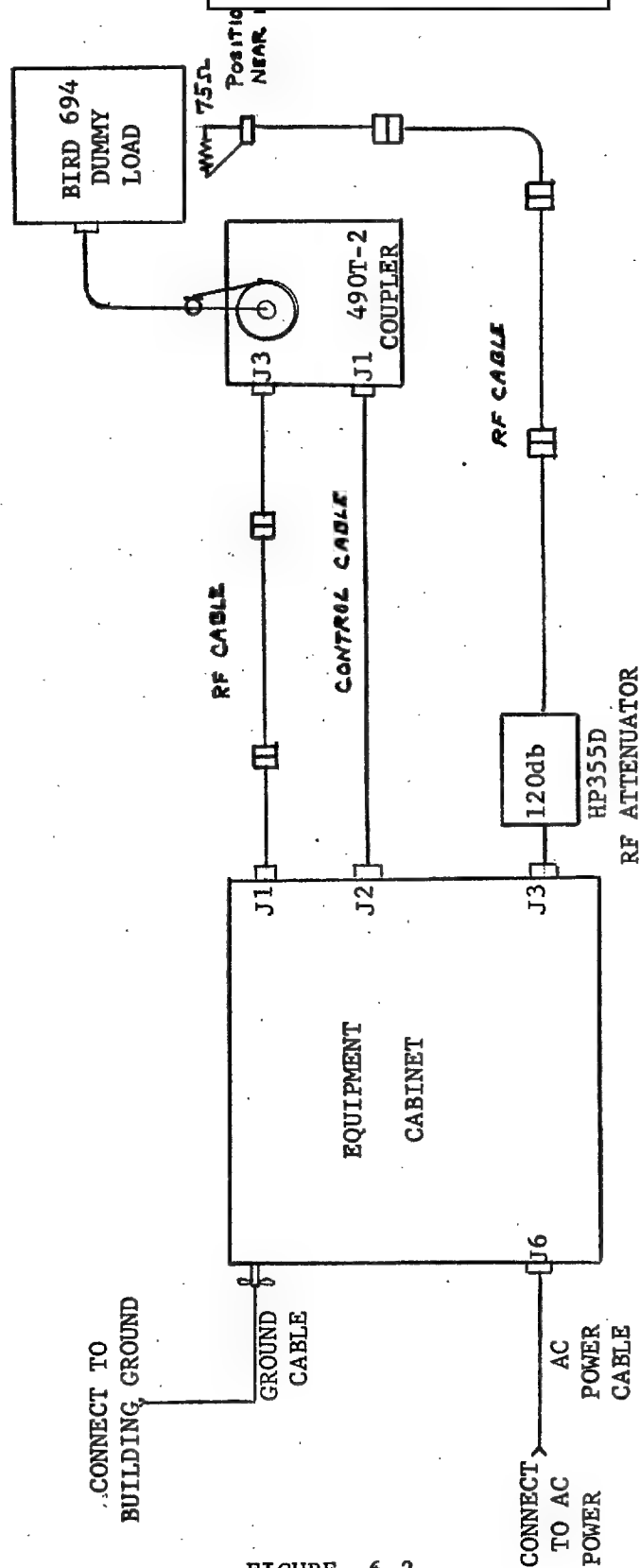


FIGURE 6-2

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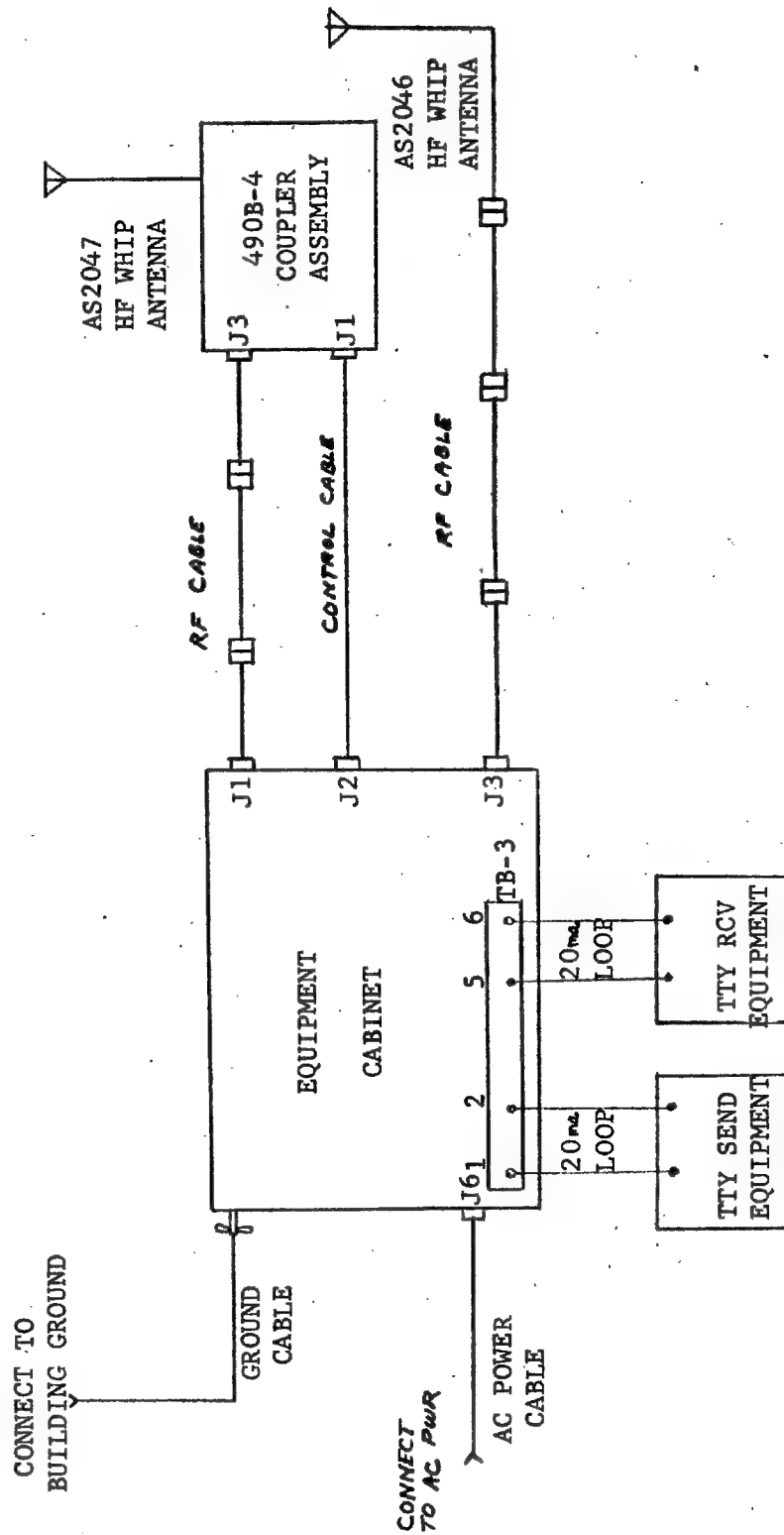


FIGURE 6-3

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7.0 TEST DATA

Paragraphs in this section are numbered the same as the tests to be performed in Section 5.0, except for the first digit. In other words 7.1.1 is the test data in paragraph 5.1.1.

7.1 Set-Up	Data	Limits
7.1.1 Equipment location, etc.	___ OK	
7.1.2 Equipment/cable location, etc.	___ OK	
7.1.3 Building primary voltage	___ vac	208vac ⁺ 10%
7.2 OFF-AIR Tests		
7.2.1 Audio Control Panel Test		
7.2.1.1 Equipment connected, switch selections made.	___ OK	
7.2.1.2 Power supply adjusted	___ OK	
7.2.1.3 Check CW OSC-1	___ kHz ___ dbm	1kHz ⁺ 10% Reference
7.2.1.4 Tone with key released	___ kHz ___ dbm	0 0
7.2.1.5 Check CW OSC-2	___ kHz ___ dbm	1kHz ⁺ 10% Reference
7.2.1.6 Tone with Key released	___ kHz ___ dbm	0 0
7.2.1.7 Tone at Speaker No. 1	___ OK	
7.2.1.8 Speaker No. 1 circuit operation	___ OK	
7.2.1.9 Speaker Muting	___ OK	
7.2.1.10 Headset circuit operation	___ OK	
7.2.1.11 Tone absence with release of CW Key	___ OK	
7.2.1.12 Tone at Speaker No. 2	___ OK	

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	<u>Data</u>	<u>Limits</u>
7.2.1.13 Speaker No. 2 circuit operation	___ OK	
7.2.1.14 Speaker Muting	___ OK	
7.2.1.15 Headset circuit operation	___ OK	
7.2.1.16 Tone absence with release of CW Key	___ OK	
7.2.1.17 VOM (CW Keyline)	___ ohms	0 ohms
7.2.1.18 VOM (FSK Keyline)	___ ohms	0 ohms
7.2.1.19 VOM (OFF)	___ ohms	Open
7.2.1.20 READY light lighted	___ OK	
7.2.1.21 FAULT light lighted	___ OK	
7.2.1.22 READY light lighted	___ OK	
7.2.1.23 FAULT light lighted	___ OK	
7.2.1.24 Equipment connected Switch selections made	___ OK	
7.2.1.25 Step-down voltage	___ vac	104vac ⁺ -10%
7.2.1.26 Remove strap Switch selections made	___ OK	
7.2.1.27 Power supply voltage	___ vdc	28 ⁺ 1vdc
7.2.1.28 Voltage at the ACP	___ vdc	28 ⁺ 1vdc
7.2.1.29 Voltage at Equipment Shelf	___ vdc	28 ⁺ 1vdc
7.2.1.30 FSK No. 1 Space Tone	___ Hz ___ dbm	2125 Hz Reference
7.2.1.31 FSK No. 1 Mark Tone	___ Hz ___ dbm	2975 Hz Reference
7.2.1.32 MARK INDICATOR light	___ OK	

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7.2.1.33	SPACE INDICATOR light	___	OK	
7.2.1.34	FSK No. 2 Space tone	___	Hz	2125 Hz
		___	dbm	Reference
7.2.1.35	FSK No. 2 Mark tone	___	Hz	2975 Hz
		___	dbm	Reference
7.2.1.36	MARK INDICATOR lights	___	OK	
7.2.1.37	SPACE INDICATOR lights	___	OK	
7.2.1.38	Tune hf receiver	___	OK	
	Connect test equipment			
7.2.1.39	Receiver output - VTVM	___	dbm	Reference
7.2.1.40	MARK INDICATOR lights	___	OK	
7.2.1.41	Receiver output VTVM	___	dbm	Reference
7.2.1.42	SPACE INDICATOR lights	___	OK	
7.2.1.43	Equipment disconnected	___	OK	
7.2.2	HF Tests			
7.2.2.1	Equipment Connected	___	OK	
7.2.2.2	READY light operates	___	OK	
	FAULT light off	___	OK	
7.2.2.3	Rf wattmeter	___	watts	NLT 200w
	Dummy load wattmeter	___	watts	Reference
7.2.2.4	Rf wattmeter	___	watts	NLT 200w
	Dummy load wattmeter	___	watts	Reference
7.2.2.5	Rf wattmeter	___	watts	NLT 200w
	Dummy load wattmeter	___	watts	Reference
7.2.2.6	Rf wattmeter	___	watts	NLT 200w
	Dummy load wattmeter	___	watts	Reference
7.2.2.7	Rf wattmeter	___	watts	0 watts
	Dummy load wattmeter	___	watts	0 watts
7.2.2.8	READY light operates	___	OK	
	FAULT light off	___	OK	
7.2.2.9	Equipment connected	___	OK	

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	<u>Data</u>	<u>Limits</u>
7.2.2.10 Receiver adjusted	___ OK	
7.2.2.11 CW tone in Speaker	___ OK	
7.2.2.12 CW tone in Speaker	___ OK	
7.2.2.13 FSK Space tone in Speaker	___ OK	
7.2.2.14 FSK Mark tone in Speaker	___ OK	
7.2.2.15 TTY Equipment Connected	___ OK	
7.2.2.16 Loop current check		
Send side	___ ma	20ma \pm 2ma
Receive side	___ ma	20ma \pm 2ma
7.2.2.17 Good copy no errors FSK No. 1	___ OK	
7.2.2.18 Good copy no errors FSK No. 2	___ OK	
7.2.2.19 Equipment disconnected	___ OK	

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REMARKS

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INTRODUCTION

STAT

[] is pleased to present this proposal for
three transportable communication terminals. The scope of work
defined in this proposal reflects the operational and technical
decisions agreed to at the program meeting held []

STAT

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[] 5 June 1969.

W O # 4

3 TRANSPORTABLE CIMMO RACKS.

CUSTOMER : U.S.A.F.

13 JUN 1969

SECTION 1. SCOPE

This proposal establishes the requirements for performance, design, and test of functional grouping of equipments identified as the air-to-ground station terminal and the point-to-point station terminal.

The air-to-ground (A/G) terminal provides a means to accomplish air-ground voice communications by UHF and HF transmission. Two identical terminals are provided.

The point-to-point (P/P) terminal provides a means to accomplish point-to-point CW and FSK communications by HF transmission. One terminal is provided.

SECTION 2. APPLICABLE DOCUMENTS

Not applicable

SECTION 3. REQUIREMENTS

3.1 PERFORMANCE

The major mission of the air-to-ground and point-to-point terminals will be to provide the designated communications. To support this mission, a high degree of transportability is required and the system design considers the reoccurring deployment, setup, operation and storage requirements.

3.1.1 FUNCTIONAL CHARACTERISTICS

a. Air-To-Ground Terminal (A/G)

1. The A/G terminal provides air-to-ground voice communications in the 2 to 29.9999 MHz and in the 225 to 399.95 MHz frequency

regions. The terminal consists of a 400 watt, pep./average hf transceiver and a 10 watt uhf transceiver housed in two transportable containers.

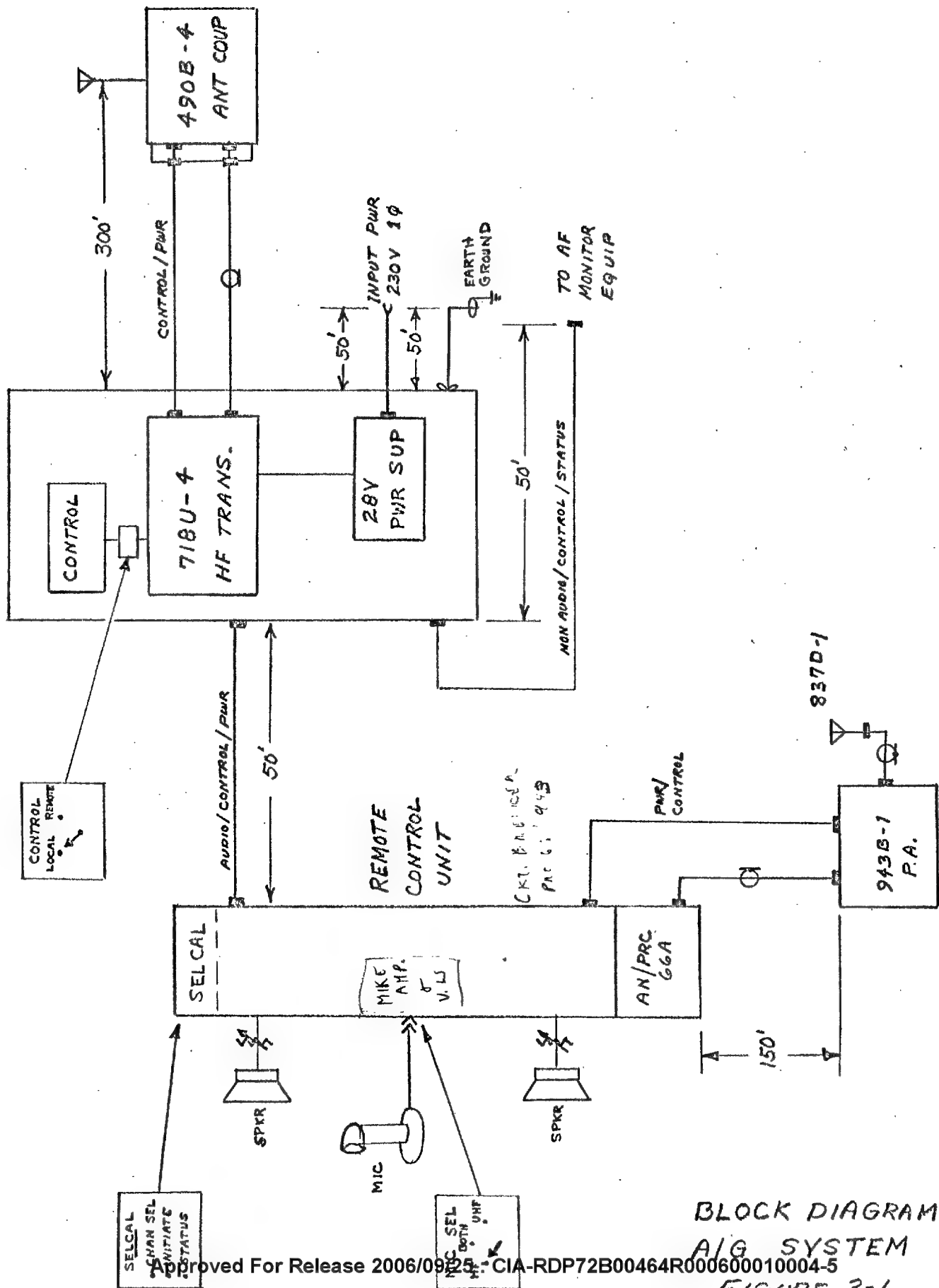
2. The terminal has the following capabilities:

- (i) One half-duplex voice channel in the 2 to 29.9999 MHz high frequency region.
- (ii) One half-duplex voice channel in the 225 to 399.95 MHz ultra-high frequency region.
- (iii) Simultaneous modulation on both channels.
- (iv) Digital data rates on the hf channel up to 2400 bits per second with appropriate modem.

3. A simplified block diagram of the functional system is shown in figure 3-1. Normal operation of the terminal is from the remote control unit. (RCU). Full control of the uhf portion of the system is provided by the AN/PRC-66A transceiver. Control of the hf portion is accomplished at the equipment cabinet with remote capability extended to the AF Monitor Terminal. The hf antenna coupler and the uhf linear power amplifier are automatically tuned devices capable of complete remote control.

b. Point-To-Point Terminal (P/P)

- 1. The P/P terminal provides point-to-point communications by CW and fsk (RTTY) in the 2 to 29.9999 MHz high frequency region. The terminal is a 400 watt pep./average transceiver housed in a dual container configuration.
- 2. The terminal has the following capabilities:
 - (i) One full-duplex CW channel in the 2 to 29.9999 MHz high



BLOCK DIAGRAM
A/G SYSTEM

FIGURE 3-1

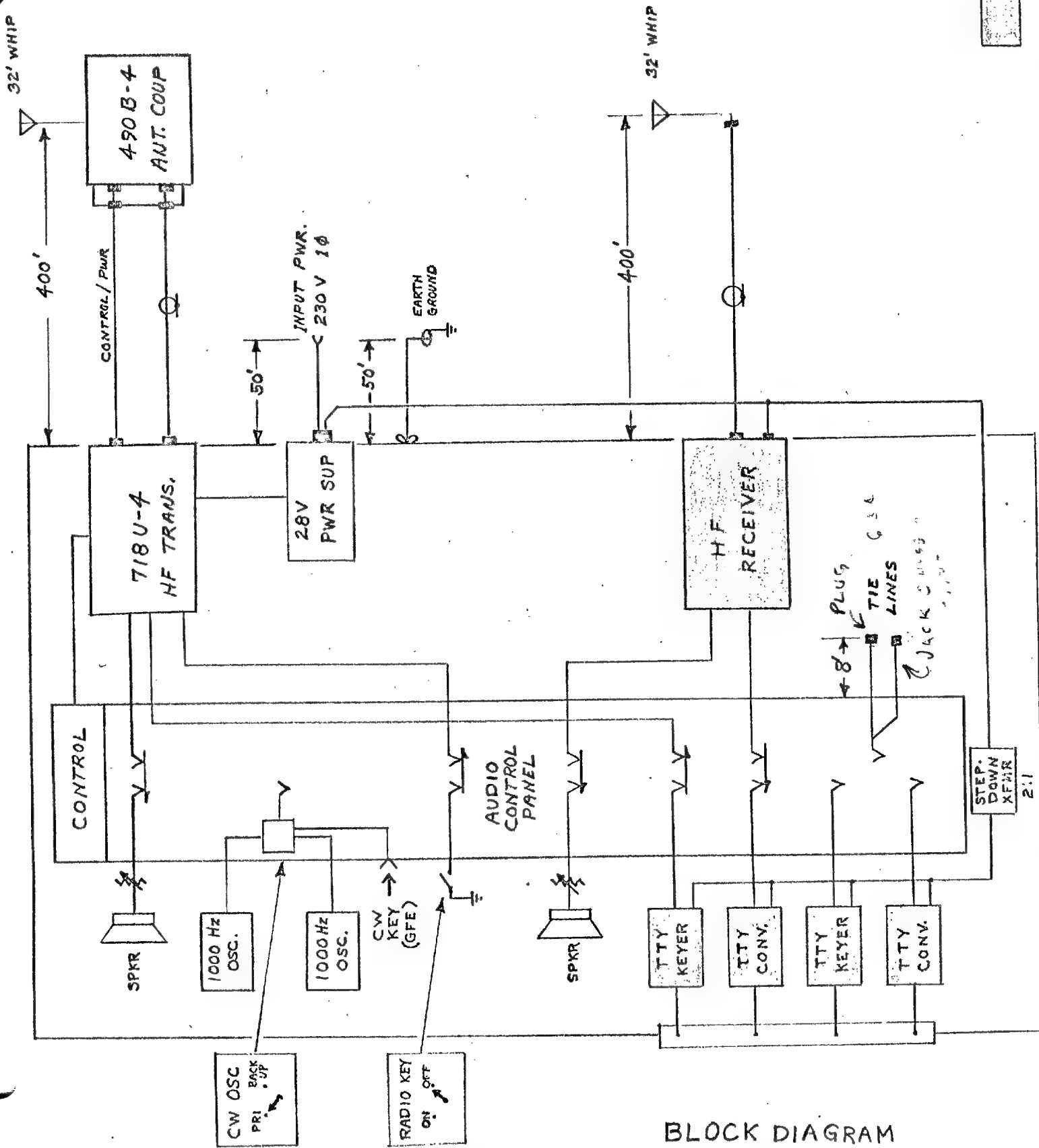
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frequency region.

(ii) One full-duplex RTTY channel in the 2 to 29.9999 MHz
high frequency region.

3. A simplified block diagram of the functional system is shown in figure 3-2. External GFE teletypewriter equipment must be connected to the system before normal operation can take place. With the use of the manual patch facilities, a CW circuit is initially established in a full-duplex configuration. The patch cords are then removed, reconfiguring the system for radio teletypewriter operation.

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BLOCK DIAGRAM

PT/PT SYSTEM

FIGURE 3-2

3.1.1.1 PRIMARY PERFORMANCE CHARACTERISTICS

- a. The air/ground terminal consists of two transportable packages containing the following items.

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>
		EQUIPMENT CABINET
1.	1	671U-4A hf transceiver
2.	1	548T-1 power amplifier
3.	1	636X-2 power supply
4.	1	499R-13 equipment shelf
5.	1	DCR40-60A dc power supply
6.	1	Radio control panel (714E-6 mod)
7.	1	Remote control unit
8.	1	AN/PRC-66A UHF transceiver
9.	1	Microphone (ptt) w/stand, cable and connector
10.	1	50 ft. length of 3 conductor power cable
11.	1	50 ft. length of grounding cable w/rod
		AUXILIARY EQUIPMENT CASE
12.	1	490B-4 antenna coupler
13.	1	943B-1 power amplifier
14.	1	AS-2047/TRC 32 ft. hf whip antenna
15.	1	837D-1 uhf antenna
16.	4	100 ft. length of Superflex coax w/connectors
17.	1	50 ft. length of Superflex coax w/connectors
18.	1	300 ft. length of control/power cable w/connectors
19.	1	50 ft. length of audio/control/power cable w/connectors
20.	1	50 ft. length of audio/control cable w/connectors
21.	1	150 ft. length of control/power cable w/connectors

GFE Items - None

- b. The point-to-point terminal consists of two transportable packages containing the following items.

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>
		EQUIPMENT CABINET
1.	1	671U-4A hf transceiver
2.	1	548T-1 power amplifier
3.	1	636X-2 power supply
4.	1	499R-13 equipment shelf
5.	1	DCR40-60A dc power supply
6.	1	Audio control panel (714E-6 mod)
7.	2	1000 Hz CW oscillator
8.	1	Voltage step-down transformer
9.	1	50 ft. length of 3 conductor power cable
10.	1	50 ft. length of grounding cable w/rod
		GFE ITEMS
11.	1	RA-6217 hf receiver
12.	2	F-1200 fsk converter
13.	1	Type 244 dual frequency shift tone keyer shelf (2 ea. 211 tone keyer)
14.	1	CW key w/cable and plug
		AUXILIARY EQUIPMENT CASE
15.	1	490B-4 antenna coupler
16.	1	AS-2047/TRC 32 ft. hf whip antenna (tx)
17.	1	AS-2046/TRC 32 ft. hf whip antenna (rcv)
18.	8	100 ft. length of Superflex coax w/connectors
19.	1	400 ft. length of control/power cable
20.	8 1	8 ft. tie-line cable w/connector

3.1.1.1.1 CONTAINER DESIGN

a. Equipment Cabinet

The equipment cabinet design will utilize the latest techniques in modular packaging. Construction concepts using heavy duty aluminum or sandwich core panels bonded to an extruded aluminum framework provide a rugged, lightweight container. Equipment mounting rails are provided as an integral part of the framework. Space within the cabinet will be utilized to the maximum extended possible for stowage of ancillary items. The front and rear panels are removable for easy access to the equipment.

b. Auxiliary Equipment Case

The auxiliary equipment case is constructed in a similar manner to the equipment cabinet. Stowage aids and interior partitioning within the case provide a secure, transportable container.

c. Weight and Size

Refer to Tables 3-1 and 3-2 for a tabulation of the approximate weight and size of the two terminals. Exact dimensions of the containers will not be available until after the cabinet mock-ups have been approved.

TABLE 3-1

APPROXIMATE WEIGHT AND SIZE OF A/G SYSTEM

Equipment Cabinet 290 lbs.

Includes:	1. 718U-4 HF Transceiver	38 lbs.
	2. Shelf, mounting (718U-4)	12
	3. Control Panel	7
	4. Drawer, storage	7
	5. Remote Control Unit	12
	6. Microphone	3
	7. PRC-66 UHF Transceiver	10
	8. Power Supply	131
	9. Power Cable (50')	20
	10. Cabinet	50

Transit Case Loaded 280 lbs.

Includes:	1. Case, Transit	50 lbs.
	2. 490B-4, Antenna Coupler	40
	3. Coaxial Cable (450')	72
	4. Coupler Control Cable (300')	57
	5. UHF Antenna & Case	15
	6. Antenna Base & Guys	4
	7. Cable Reels	5
	8. RCU Control Cable (50')	10
	9. Monitor Control Cable (50')	10
	10. 943B-1 UHF P. A.	8
	11. UHF Control Cable (150')	9

Total System Weight 570 lbs.

Equipment CabinetTotal Cubage

Height	31 inches	9.9 cu.ft.
Width	22 inches	
Depth	25 inches	

Auxiliary Equipment Case

Height	18 inches	14.0 cu.ft.
Width	54 inches	
Depth	25 inches	

TABLE 3-2

APPROXIMATE WEIGHT AND SIZE OF P/P SYSTEM

Equipment Cabinet 320 lbs.

Includes:	1. RA-6217 HF Receiver (GFE)	25 lbs.
	2. 718U-4 HF Transceiver	38
	3. Shelf, mounting (718U-4)	12
	4. Audio Control Panel	20
	5. FSK Modem	21
	6. CW Key (GFE)	3
	7. Power Supply (2)	131
	8. Power Cord (50')	20
	9. Cabinet	50

Transit Case Loaded 310 lbs.

Includes:	1. Case, Transit	50 lbs.
	2. 490B-4 Antenna Coupler	40
	3. Coaxial Cable (800')	128
	4. Coupler Control Cable (400')	74
	5. Cable Reels	8
	6. Antenna Base and Guys	10

Total System Weight 630 lbs.

Equipment CabinetTotal Cubage

Height	33 inches	10.5 cu.ft.
Width	22 inches	
Depth	25 inches	

Auxiliary Equipment Case

Height	18 inches	14.0 cu.ft.
Width	54 inches	
Depth	25 inches	

3.1.1.1.2 CONNECTOR ENTRY PANEL

A connector entry panel shall be provided in the equipment cabinet for all interconnecting interface cables. Terminal blocks shall be provided on this panel where required.

3.1.1.1.3 GROUNDING

A threaded stud with washers and a wing nut shall be provided on the equipment cabinet frame for attaching a ground cable. The electrical system and all metal surfaces of the cabinet shall be grounded through this stud. A suitable ground rod and 50 feet of cable shall be provided.

3.1.1.1.4 ELECTRICAL INPUT POWER

- a. A/G Terminal - All equipments within the A/G terminal operate from voltages derived from the 28 volt power supply. The input to the 28 volt power supply requires a single-phase, nominal 208/230 volt, 47-63 Hz source.

The 50 foot 3-wire power cable shall connect directly to the dc power supply. The cable shall be permanently affixed at the cabinet. The free end of the cable shall be provided with a pig-tail termination. Storage space for the cable shall be provided in the cabinet.

- b. P/P Terminal - The P/P terminal shall operate from a single-phase primary power source nominal 208/230 volt, 47-63 Hz. A step-down transformer shall be provided to supply power to the GFE equipments which require a 120 volt single-phase source.

The 50 foot 3-wire power cable shall be permanently affixed to a terminal block within the cabinet. Distribution and circuit protection from the terminal block shall be provided. The free end of the cable shall be provided with a pig-tail termination. Storage space for the cable shall be provided in the cabinet.

3.1.1.1.5 EQUIPMENT CABINET CONFIGURATION

- a. A/G Terminal - The equipment cabinet for the A/G Terminal contains the following items:

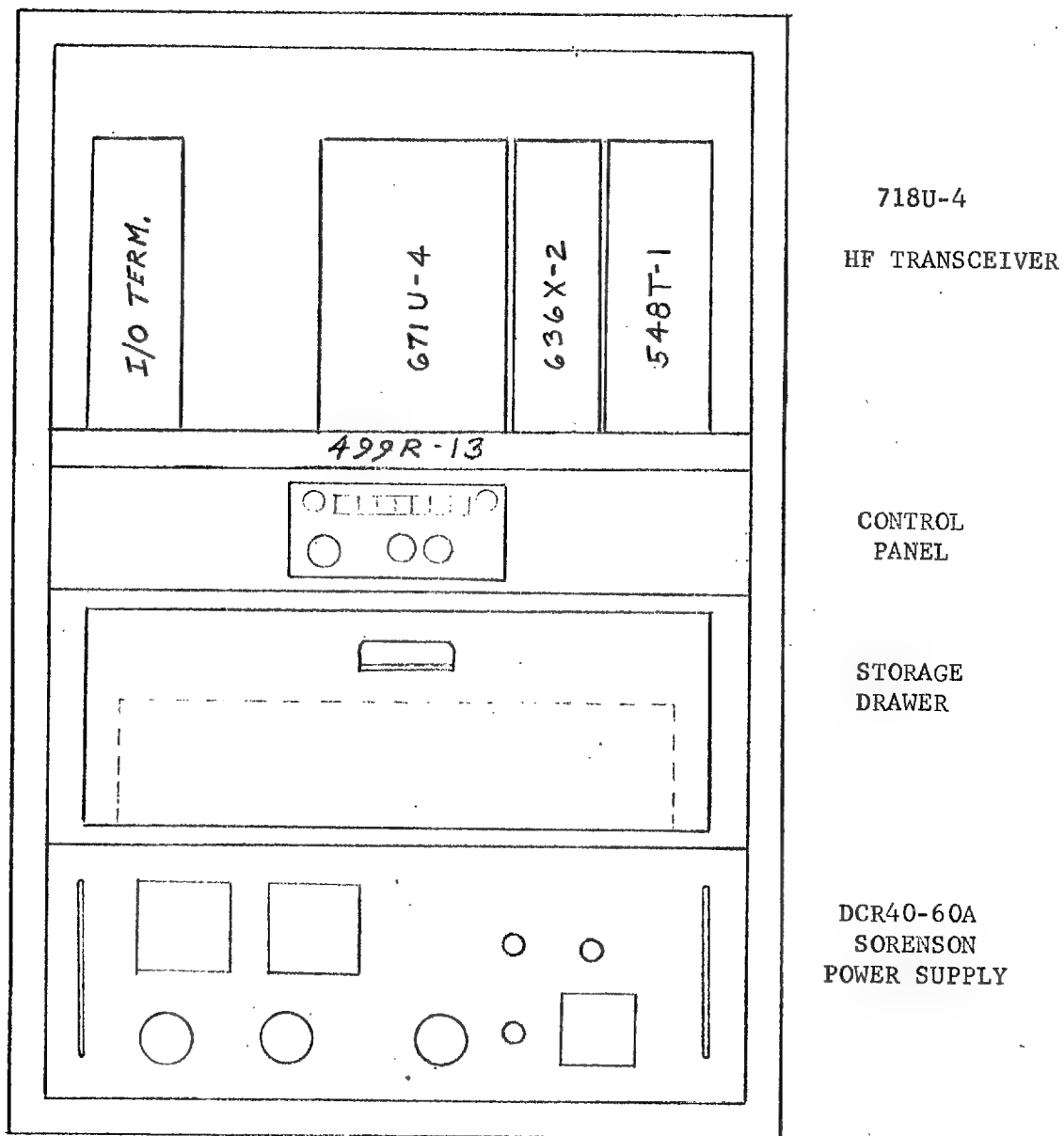
- (1) 671U-4 hf transceiver
- (2) 548T-1 power amplifier
- (3) 636X-2 power supply
- (4) 499R-13 shelf
- (5) Control panel
- (6) Storage drawer
- (7) DCR40-60A power supply

The rack face drawing for the equipment cabinet is shown in Figure 3-3. Brief equipment descriptions are given in section 3.1.1.1.6.

- b. P/P Terminal - The equipment cabinet for the P/P Terminal contains the following items:

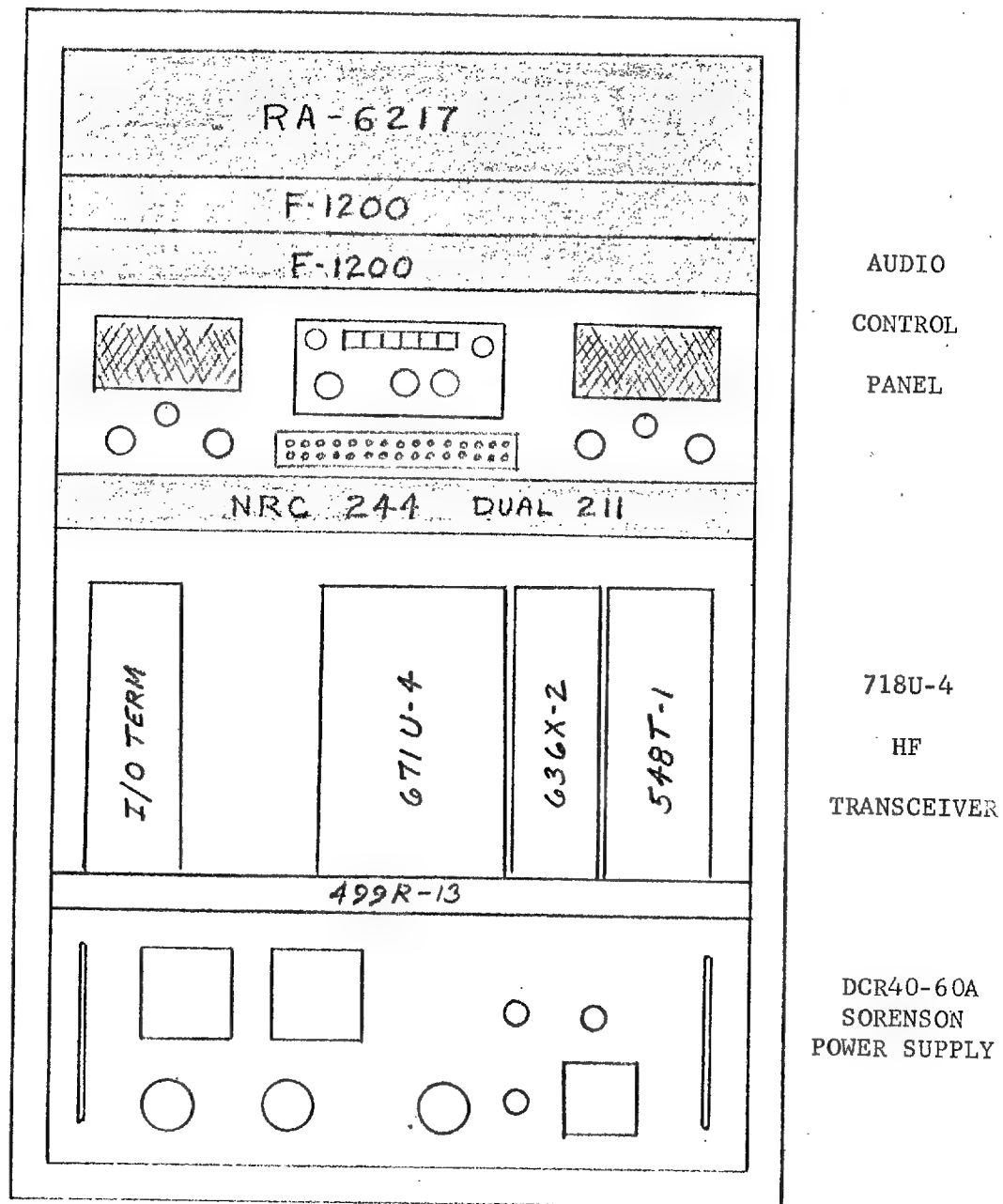
- (1) RA-6217 hf receiver (GFE)
- (2) F-1200 fsk converter (GFE) 2 ea.
- (3) Audio control panel
- (4) NRC 244 fsk tone keyer shelf (GFE)
- (5) 671U-4 hf transceiver
- (6) 548T-1 power amplifier
- (7) 636X-2 power supply
- (8) 499R-13 shelf
- (9) DCR40-60A power supply

The rack face drawing for the equipment cabinet is shown in Figure 3-4. Brief equipment descriptions are given in section 3.1.1.1.6.



A/G RACK FACE

FIGURE 3-3



PT/PT RACK FACE

FIGURE 3-4

GFE

3.1.1.1.6 EQUIPMENT DESCRIPTION

a. A/G Terminal

- (1) HF Transceiver - The 718U-4 hf transceiver is made up of the 671U-4 transceiver, the 548T-1 power amplifier, and 636X-2 power supply.

The 718U-4 is a 400 watt pep. and average power hf transceiver which operates in the 2 to 29.9999 MHz high frequency range in 100 Hz increments. The individual units are packages in ATR cases to provide a convenient and reliable means of rack mounting. The 499R-13 equipment shelf provides the hold-down mechanism, the interfacing unit connectors and the input/output terminal block for the internal and external shelf wiring.

- (2) Control Panel - The control panel provides local control of the hf radio. The 714E-6 control unit is mounted on the panel to provide frequency/mode selection and squelch controls. A remote/local switch on the panel will transfer control of the 718U-4 transceiver to a remote control unit located at the AF Monitor Terminal to a distance of up to 50 feet from the cabinet. The remoted 714E-6 control unit is not provided with the terminal.

Hf radio fault and status indicator lamps are provided on the control panel. The fault and status lamps are wired in parallel to provide the identical information to the AF Monitor Terminal.

- (3) Storage Drawer - The storage drawer is provided in the cabinet to permit storage of the remote control unit and other items associated with the rack operation. See section 3.1.1.1.6a(5).
- (4) Power Supply - The 28 volt power supply will be the Sorensen model DCR40-60A. The DCR series provides all silicon, solid state design with voltage and current regulation. Operating at an output voltage of 28.0 volts the supply can maintain a continuous output current of 65 amperes at an ambient temperature of 55°C.
- (5) Remote Control Unit - The remote control unit extends the audio/keyline of the hf radio circuit up to a distance of 50 ft. from the equipment cabinet. Space is provided in the remote control unit to insert the transceiver portion of the AN/PRC-66A. The uhf transceiver is then used to drive a 10 watt power amplifier located up to a distance of 150 ft. from the remote control unit.

Audio circuitry within the RCU is designed to allow voice modulation on either radio or on both simultaneously. A volume unit (VU) meter will be provided on the front for circuit monitoring of the unit. Two speakers with independent volume controls are connected to the radio outputs.

The transit and receive audio lines of each radio circuit are parallel to allow full monitoring capability. The bridging impedance is not provided as part of the terminal, this

must be included with the external monitoring equipment.

Remote controls for an external selective calling system are provided in the RCU. The components to be supplied are a four-position channel select switch, a pushbutton initiate switch, and an indicator lamp.

- (6) UHF Transceiver - The uhf transceiver for this system is composed of the transceiver portion of the AN/PRC-66A and the 943B-1 power amplifier. The AN/PRC-66A is a portable transceiver which provides AM communication on any one of 3,500 channels in the 225.0 to 399.95 MHz ultra-high frequency range. The average power output is 2 watts which is used to drive the 943B-1 UHF amplifier. The 943B-1 is a broadband power amplifier capable of providing a 10-watt rf power output in the 225 to 400 MHz frequency range. The 943B-1 requires a minimum input of 0.5 watts to produce the rated output. Coaxial cable attenuation at the high end of the frequency range limits the distance the power amplifier can be remoted from the transceiver to a maximum of 150 feet.

(7) Antenna System -

- (i) HF Circuit - The antenna system for the hf link will consist of the 490B-4 antenna coupler and the AS-2047/TRC whip antenna. The 490B-4 consists of the 490T-2 automatic antenna coupler, load coil, switching relay, and cooling blower all contained in an environmentally sealed housing. The 490T-2 is an automatically tuned hf antenna coupler

designed to tune wire and whip antennas in the frequency range of 2 to 30 MHz. The coupler has an input power rating of 500 watts average. The 490B-4 has a T/R switch, but this will not be used in the normal operating configuration. A coaxial relay mounted on the 499R-13 shelf in the equipment cabinet will serve as the system T/R switch. A "tee" connection off of the relay will provide a secondary receive input.

The AS-2047/TRC is a 32 foot fiber whip antenna which will mount directly on to the 490B-4 coupler. The AS-2047/TRC is assembled from 4 foot sections.

The coaxial feed between the 718U-4 transceiver and the 490B-4 coupler will consist of three, 100 foot sections of Andrew FSJ4 Superflex coaxial cable.

(ii) UHF Circuit - The uhf antenna to be used will be the 837D-1 UHF blade antenna. The 837D-1 is a lightweight, broadband antenna designed for operation within the 225 to 400 MHz frequency range. The antenna is a vertically polarized monopole with an input impedance of 50 ohms.

The 837D-1 will be attached to a combination ground plane/sunshade with the 943B-1 power amplifier mounted directly underneath.

b. P/P Terminal

- (1) HF Receiver - RA6217 GFE Item
- (2) FSK Converter - F-1200 GFE Item
- (3) Audio Control Panel - The audio control panel provides local

control of the hf radio and circuit patching capability.

The 714E-6 control unit is mounted on the panel to provide

frequency and mode control to the hf transceiver. Dual

speakers with independent volume controls are provided on

the panel to allow simultaneous monitoring of both hf

receivers. Dual 1000 Hz CW tones are switch selectable from

the panel to provide a patchable input to the radio circuit.

The audio circuits from the GFE fsk modems are brought to the

patch panel. One circuit is normalled through to the hf

equipment, the backup circuit is available on a patched basis.

(4) FSK Keyers - NRC 244 GFE Item

(5) HF Transceiver - See section 3.1.1.1.6a(1).

(6) Power Supply - See section 3.1.1.1.6a(4).

(7) Antenna System

(1) HF Circuit - The antenna system for the 718U-4 hf transceiver will utilize the identical system as described in section 3.1.1.1.6a(7). The only addition is that the coaxial feed line will consist of four, 100 foot sections of Andrew FSJ4 Superflex coaxial cable.

The antenna to be used with the GFE hf receiver is the

AS2046/TRC whip antenna. The AS2046/TRC is similar to the

AS2047/TRC, the only difference is in the base plate and rf connector assembly.

The coaxial feed between the AS2046/TRC and the GFE receiver will consist of four, 100 foot sections of Andrew FSJ4 Superflex coaxial cable.

SECTION 4. QUALITY ASSURANCE PROVISIONS

4.1 MECHANICAL MOCK-UP

A mechanical mock-up for each type equipment cabinet will be made prior to the final system build. The mock-up will make use of those purchased or fabricated items which are on-hand at the time of the demonstration. All other equipment items will be simulated. Particular attention will be paid to connector locations and cabinet cabling.

4.2 TESTS

At the completion of the system build and checkout, acceptance tests will be performed on all systems. It is planned to check-out the AF Monitor Terminals in conjunction with the A/G Terminals. The customer will be required to furnish personnel familiar with the GFE units to assist during the testing period.

Acceptance tests will include, but not necessarily be limited to tests of the following:

- a. Power output (each radio set)
- b. USB (hf radio set)
- c. LSB (hf radio set)
- d. CW (hf radio P/P only)
- e. Remote control operation
- f. Tuning (each radio set)
- g. Speech operation
- h. Simultaneous operation of both hf and uhf radios.

SECTION 5. SCHEDULE

The proposed schedule for the program is shown in Table 5-1. The delivery dates for the hf and uhf equipment are constraining items. Any equipment or packaging changes as a result of the mock-up review will modify the final delivery date. The government furnished equipment must be delivered in good operating condition on or before the time specified in the attached schedule.

STAT

TABLE S-1

PROGRAM SCHEDULE

	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.
ORDER, PRODUCT LINE EQUIPMENT ON ORDER	△					▲	
PROGRAM PLAN		△	▲				
SYSTEM DESIGN		△		▲			
ORDER PARTS AND MATERIAL			△		▲		
PREPARE DRAFT SYSTEMS MANUAL			△	▲			
PREPARE TEST PROCEDURES				△	▲		
CUSTOMER REVIEW AND APPROVAL OF MOCK-UP				△	▲		
SHELF AND PANEL BUILD				△	▲		
ARRIVAL GFE SYSTEM ITEMS					▲		
CABINET WIRING AND CHECKOUT					△	▲	
ARRIVAL GFE AF MONITOR TERMINAL						▲	
ACCEPTANCE TEST						△	▲

▲ SCHEDULE COMPLETE

△ SCHEDULE START